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ABSTRACT

A study was conducted to examine the presence and composition of nonverbal cues exhibited in a spontaneous dyadic interaction and to investigate the assumption that cue variation is inconsequential to the effect of nonverbal behavior implicit in methods that aggregate cue incidence across interactions. Subjects, 110 college undergraduates, worked in dyads with partners who were previously unknown to them. Each partner in a dyad was given a position to advocate and minutes in which to argue that position. Each interaction was videotaped and coded at 2-minute intervals for a variety of proxemic, kinesic, and vocalic cues. Results showed that nonverbal behaviors did vary consistently, forming combinations of cues within rather than across nonverbal channels. A combination of aggregate scores of the nonverbal factors, including increased proxemic shifts, increased kinesic behavior, increased vocalic intensity, decreased vocal quality, increased random movement, and more direct body orientation predicted "winning" in the interaction. In addition, high vocal fluency in the first time period, increased kinesic behavior in the third time period, and high vocal intensity in the last time period predicted "losing" in the interaction. (FL)

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# An Investigation of Nonverbal Cue Combinations and the Validity of Aggregation Measurement Techniques in a Spontaneous Persuasive Interaction

by

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Abstract

Previous research on the role of nonverbal communication in persuasive interactions has identified the importance of kinesic, vocalic, haptic and proxemic cues to the outcome of appeals. Limited research has revealed that combinations of these cues may be more important than individual cues alone. The purpose of the present study was to further examine the presence and composition of combinations of nonverbal cues exhibited in a spontaneous dyadic interaction. Further the assumption that cue variation is inconsequential to the effect of nonverbal behavior implicit in methods which aggregate cue incidence across the entire interaction was examined. Fifty-five dyads comprised of undergraduate students interacted for ten minutes, with the purpose of choosing one of two candidates to fill a teaching job. Behavioral commitment to hiring a certain candidate was measured. A variety of proxemic, kinesic, and vocalic cues were measured at two minute time intervals in the interaction. The results indicated that nonverbal behaviors did vary consistently, forming combinations of cues within rather than across nonverbal channels. A combination of aggregate scores of the nonverbal factors, including increased proxemic shifts, increased kinesic behavior, increased vocal intensity, decreased vocal quality, increased random movement and more direct body orientation predicted membership in the winning group, based on the results of discriminant analysis. Additionally, high vocal fluency in the first time period, increased kinesic behavior in the third time period and high vocal intensity in the last time period predicted losing in the persuasive interchange. The implications for overlooking important information with the use of aggregation techniques is discussed.

The research examining the role of nonverbal communicative behavior in the persuasive process has provided a number of important insights. A variety of nonverbal cues in the kinesic, vocalic, haptics and proxemic channels have been identified as playing a part in the outcome of the persuasive appeal. Further a limited amount of research has indicated that these nonverbal cues are exhibited concomitantly forming consistent patterns of nonverbal cues which may be more important than any of the individual cues alone. This combinational approach to nonverbal behavior has the potential to provide further insights into the operation of the nonverbal communicative channels. Much of the research, however, on these cues has not involved spontaneous cue displays; rather experimental confederates have encoded various cue combinations determined independent from the topic or context of the discussion. The present study examines the patterns of nonverbal cues exhibited spontaneously by persons engaging in a dyadic persuasive interaction in order to provide more evidence as to presence and composition of these naturally occurring nonverbal cue combinations. Further, the design provides for a validity check on the measurement methodology employed in many experiments of this type. Much of the research measuring nonverbal cue displays uses procedures which aggregate the incidence of a particular cue across the entire interaction. This method implicitly assumes that the variation in cue displays within the interaction is unimportant to the outcome. This is a very strong assumption given the dynamic nature of nonverbal communication recognized by many authors (Burgoon & Saine, 1976; Knapp, 1976; LaFrance & Mayo, 1978). Research on the effects of distractions and violations of expectations in human communicative interchanges, especially persuasive ones, raises questions

concerning the validity of such a strong methodological assumption. This study will compare measures of cue displays at intervals within an interaction with aggregate measures for the entire interaction.

Nonverbal Cues in Persuasive Interchanges

Past research suggests that a number of nonverbal cues have the potential to impact the persuasive message. Specifically, positive relationships have been identified between attitude change and direct body orientation (McGinley, LeFevre & McGinley, 1975), conversational distance (Albert & Dabbs, 1970; Stacks & Burgoon, 1979a), eye contact (Timney & London, 1973), speech rate (Miller, Maruyama, Beaber & Valone, 1976), and speech fluency (McCroskey & Mehrley, 1969; Sereno & Hawkins, 1967). The effects of a number of these cues seem to be mitigated by certain source specific variables. The research on distance indicates that its persuasive impact is influenced by the reward valience of the source. That is, a rewarding communicator can enhance the efficacy of her/his persuasive message by changing her/his proximity to the dyadic partner (Albert & Dabbs, 1970; Stacks & Burgoon, 1979a). It appears that a rewarding communicator's violations of conversational distance expectations (regardless of direction) causes the receiver to attribute these violations as positive communicative cues, facilitating attitude change. Similarly speech fluency appears to be affected by the organization of the persuasive speech. McCroskey and Mehrley (1969) found that poor organization in combination with speech disfluency produced the least persuasion. Further the findings suggest that organization may be more important than speech fluency in producing attitude change in the receiver. Research on the ratings of a

speaker's persuasiveness also confirm some of the findings of the attitude change research. Both conversational proximity (Mehrabian & Williams, 1969) and directness of body orientation (Riess, 1978) showed positive relationships with perceived persuasiveness of a communicator. These results should be interpreted with some caution, though, since the actual persuasive effect of the messages was not measured.

Another important finding of a few of the past investigations of persuasive interactions is that the nonverbal cues form consistent combinations which may be more influential than any of the cues displayed individually. Mehrabian and Williams (1969) found that patterns of nonverbal cues were consistently displayed by encoders and that these patterns were associated with perceptions of persuasiveness. A cluster including high eye contact, backward reclining angle, increased head nodding, increased gestural manipulation, increased facial activity, faster speech rate, louder speech volume, more precise intonation and highly fluent speech was associated with ratings of intent to persuade. Sex of the source interacted slightly with this cluster, such that females were perceived as intending to persuade when displaying high levels of self-manipulators and decreased trunk swiveling. Ratings of perceived persuasiveness were given to communicators who displayed increased facial activity, increased eye contact, more gestural animation, decreased self-manipulations and a less direct shoulder orientation.

Results of research by LaCrosse (1975) also demonstrate the effect of the patterns of nonverbal cues on perceptions of persuasiveness. The encoders in this experiment displayed combinations of affiliative cues (80% eye contact, smiling, positive head nods, gestural activity, direct

body angle, and 20° forward body lean) and nonaffiliative cues (40% eye contact, 30° shoulder orientation away from the receiver, 20° reclining angle and all other cues absent). The resulting disordinal interaction between confederate sex and affiliative cues showed that females were perceived as displaying more persuasiveness than males when engaging in the affiliative cue pattern. Conversely, males were perceived as more persuasive than females when engaging in nonaffiliative cues. The sex interaction aside, these results indicate the potential impact of combinations of cues on the appeal. Of additional interest, LaCrosse asked the participants to indicate which cues they felt were most important in making their judgments. The cues most often cited were eye contact, smiling and gestures. While it is tenuous to rely on these self reports of effect, they suggest that certain behaviors serve as primary cues in these combinations, while others serve as secondary, modifying cues.

Unfortunately, neither of these two investigations measured actual attitude change in the receivers; however, the utility of their findings lies in the cues that were identified. Of significance in Mehrabian and Williams' work is the combinations did appear consistently, containing cues identified by other research and, more importantly, cues not identified by others. Specifically, head nodding, gestural manipulation, reclining angle, speech volume, self-manipulation, and facial activity were not identified in other past and subsequent research. Two reasons come to mind for this occurrance. First, these cues could have been overlooked by other researchers who chose a limited number of individual cues to manipulate in their experimental manipulations. Secondly, as suggested by LaCrosse's results, certain cues may play a lesser role as modifiers of other

nonverbal cues. The effect of any one of the modifying cues is minimal, but when displayed together, they produce a significant effect within the interaction. In the final analysis the most encouraging result of these experiments is that cue combinations did occur consistently and appear to have potential to influence the outcome of a persuasive interaction.

Support for a combinational approach to the examination of nonverbal behavior also is provided by examinations of other types of interactions. Kieser and Altman (1976) demonstrated that cue combinations influenced a person's perceptions of their interactional partner's degree of intimacy. Research by Burgoon, Buller, Hale, and deTurk (1982) showed that combinations of smiling, proxemic, touching, leaning and eye contact cues produced differential ratings of the relational messages sent by interactants in a dyad.

This prior research suggests that, in the present study, individuals in dyadic interactions will display nonverbal cues associated in consistent patterns. These patterns should contain cues from the same nonverbal channel (i.e., hand and leg movements) as well as cues from different nonverbal channels.

Aggregates of Communicative Behavior

Methods of measuring the exhibition of nonverbal cues in any interaction, including a persuasive one, usually involve aggregate measurements. That is, the number of cue displays is summed across the interaction, forming a total measure for that cue. A similar technique is employed when cues are manipulated experimentally. Here a cue is manipulated such that the number or degree of cue displays is constant across the stimulus interaction. In a few cases this manipulation follows a short baseline

period where the cue is not displayed or displayed to a lesser degree. All of the research cited previously employed one of these two methodologies. While the use of such aggregation techniques do have advantages, the implicit assumption is that the variance in cue display from one point to another in the interaction is of little or no consequence. Recent research focusing on the effects of distracting stimuli and violations of conversational expectations has raised questions concerning the validity of this strong assumption. The design of the present study allows an examination of this assumption.

Aggregation of cue measurements has a number of advantages which have encouraged its use. By summing cues across the interaction, the number of variables measured and analyzed is reduced significantly. This is very important, since large numbers of measurements have undesirable statistical and theoretical characteristics. First, as the number of measurements increases, tests of the predictive power of these cues are threatened by problems of multicolinearity among the measurements. Second, as the number of measures increases, the number of tests that must be performed may increase which can inflate the error region, leading to a higher probability of making a Type I error (Winer, 1971). A theoretical problem with multiple measures of cue displays is the likelihood of obtaining significant higher-order interactions. These interactions (often between four or more cues (cf. Burgoon, et al., 1982)) can overshadow significant main effects, making interpretation difficult. While it is desirable to understand the interactive nature of nonverbal cues, exploratory research should focus on understanding main effects prior to interpreting interactions. These problems all support the use of a data reduction method like the

aggregation of measurements across the interaction. A conceptual advantage stems from the use of aggregates. It may be that some nonverbal cues affect the communication process so subtly that a statistically significant effect occurs only when examining aggregations of the cue displays. This may be especially true of many of the body cues which signal intensity and relational types of messages rather than specific persuasive content (Burgoon, et al., 1982). Here some aggregation is desirable, so that the effect of these cues can be detected.

Research on distracting stimuli and violations of conversational expectations question the validity of aggregation techniques. Distraction during a persuasive interaction has been shown to both increase (Festinger & Maccoby, 1964; Rosenblatt, 1966) and decrease attitude change (Vohs & Garrett, 1968; Zimbardo, Snyder, Thomas, Gold & Gurwitz, 1970). Distraction is thought to influence the amount of counterargumentation engaged in by the recipient of the appeal. When the receiver focuses on the message, attitude change is facilitated, but, when the focus is on the distracting stimuli, attitude change is reduced (Zimbardo, et al., 1970). That nonverbal communicative cues can be distracting is central to the violations of expectations model proposed by Burgoon and her colleagues. (Burgoon, 1978; Burgoon & Jones, 1976; Burgoon, Stacks & Woodall, 1977; Burgoon, Stacks & Woodall, 1979; Stacks & Burgoon, 1979; Stacks & Burgoon, 1981). These researchers suggest that violations of conversational proxemity expectations is distracting to the conversational partner, influencing the amount of counterargumentation by the receiver. If counterargumentation is reduced, attitude change should increase. A similar argument is advanced for nonverbal dissynchony (Woodall & Burgoon, 1981).

Often these expectations are brought into the conversational setting, while others may be set by the type of behavior that has occurred earlier in the interaction. This seems to suggest that the temporal variation in displays of a nonverbal cue or combination of cues within the interaction is important to the outcome of the persuasive appeal. Distraction during periods of argument advancement may facilitate persuasion by reducing counterargumentation. Similarly, nonverbal behavior may be effective only if earlier behavior in the conversation has established expectations which are either violated or conformed to. Procedures for measuring cue displays which aggregate the displays across the entire interaction are not able to identify such variation. It may be necessary to examine behavior within the interaction as well as throughout the entire interaction, in order to fully understand the effects of nonverbal communication behavior in a spontaneous discussion.

It seems plausible that the aggregation procedures employed to measure nonverbal behavior presents a dilemma to the researcher. The data reduction properties of this procedure as well as the conceptual nature of the nonverbal phenomena argue for aggregating measurements; however, the cognitive processes operative in the interaction require a more detailed measurement of nonverbal cues. This study will provide an initial test of this problem. Aggregate measurements of cue displays within short intervals of an interaction will be compared with aggregates of the same cues across the entire interaction. The use of aggregates in the short time periods will retain the data reduction advantages of the techniques while testing the validity of across interaction aggregates. Interactions among the interval aggregates indicating violations of expectations or interac-

tions between measurements and verbal arguments indicating distraction will be left for future analyses. Hopefully this limited focus will permit a first test of the aggregation measurement techniques and the underlying theoretical assumption of inconsequential variation of cue displays.

To guide the design and analysis, the following research questions were posed:

Q1: Will nonverbal cues displayed by individuals interacting in a dyadic setting with the purpose of persuading the conversational partner, exhibit consistent behaviorial combinations?

Q2: Will aggregate nonverbal cue measurements of nonverbal cues taken at intervals within the interaction better predict the outcome of the persuasive appeal than the aggregate nonverbal cue measurements of these same cues summed across the entire interaction?

Q3: Will aggregate nonverbal cue measurements within time intervals that predict the persuasive outcome be the same as those aggregate nonverbal cue measurements for the whole interaction which predict the outcome?

## Methods

Subjects. The subjects were 110 undergraduates enrolled in a basic communication course. There were 41 males and 69 females. All subjects participated voluntarily, though they did receive extra-credit points in their classes for participation.

Discussion Topic. Each participant was provided with a description of the discussion topic (Appendix B). A hypothetical situation was created where a school board needed to make a hiring decision. The decision was narrowed to chosing between two candidates -- a male and a female. The school district had a poor record of hiring women and minorities, and the school board wanted to rectify this problem. It was noted that the courts had set legal precedents which allowed the sex of the applicant to be considered in the hiring decision. A copy of the job description was also included. Following the description, each participant was asked to advocate the hiring of one of the two candidates. There were four biographical sketches of the candidates (two for each candidate). Each subject saw one description of her/his candidate and one description of the partner's candidate. An initial set of descriptions were written for each candidate. These were pretested on a different group of Ss in upper-division communication courses. In the pre-test, the Ss, after hearing the job description, listened to an oral reading of the descriptions and indicated by a show of hands whom they would hire for the job. Two descriptions were chosen (one for each candidate) as the most equivalent based on the pretest subjects' hiring decisions. After the first few dyads completed the experiment, it became apparent that almost all the decisions were to hire the female candidate. In order to correct for this bias, a second set of descriptions, slightly more favorable toward the male candidate, were employed for the last half of the dyads (N=29).

Experimental Procedure. It was intended that the dyads be composed of strangers with minimal previous contact; therefore, the two members of each dyad were recruited from different classes and kept isolated from each

other until they entered the room where they were to interact. When the participants first arrived at the experimental laboratory, they were greeted by an experimenter who placed each member of the dyad into a separate small cubicle which contained a desk and chair. Each S completed a copy of a pretest questionnaire which assessed the S's attitudes toward current affairs issues including sex discrimination, unwillingness to communicate, and cognitive processing style. When both interactants had completed the pretest questionnaire, the E who had greeted them took them together into the experimental room. The experimental room was a medium sized classroom (20' x 40') with a two-way mirror on one wall and an extendable room divider. This divider was drawn so as to split the room in half. The Ss were taken into the half without the two-way mirror. In this half of the room were two cushioned desk chairs which could be swiveled from side to side. These chairs were placed facing each other at a distance of approximately four feet (measured from the center of the chair). Between the chairs was a microphone mounted on a stand, approximately level with the interactants faces when they were seated. On the blackboard chalk tray behind the microphone was placed a large darkroom timer which timed minutes and seconds. In full view of the Ss was a Sony Beta videotape camera and recorder. The camera was set up perpendicular to the chairs, so that both interactants were in view from their sides. The distance between the camera and the chairs was approximately 20 feet. To one side of the camera were two desk chairs for use when giving the experimental instructions. The camera was connected to a monitor hidden from the subjects' view behind the room divider. This monitor was used to determine when the discussion ended and assess any problems encountered by the Ss.

When the Ss entered the experimental room, they were instructed to sit in the desks and given a copy of the debate case with a description of the two candidates attached. They were orally instructed to read the descriptions and to indicate if they understood the directions. They were given approximately five minutes to read the cases. The E reminded them that they were to advocate the hiring of their candidate and they would have 10 minutes to convince the other person to support their candidate. The Ss were not allowed to write notes for use in the discussion; they were only allowed to use the cases as presented to them in written form.

When the Ss indicated that they understood the instructions, the E turned on the videotape recorder and camera, asked the Ss to take their seats in the two swivel chairs, started the timer set at ten minutes, and reminded them that they would have the full ten minutes to reach a decision. The E then left the room by going behind the room divider. The Ss were allowed to use any arguments they could think of to convince the partner to support their candidate. When the Ss reached a decision or when the ten minutes were up, the E returned to the experimental room and asked the Ss if they had reached a decision. The E recorded the Ss' choice of candidate or lack of choice (the dependent variable in the study), switched off the camera and led the Ss out of the room. The Ss were placed together in a third cubicle where a second E administered the posttest questionnaire, assessing the relational messages sent by the partners, the final attitudes toward the person chosen for the job, demographic characteristics and a check on the manipulations.

After the Ss had completed the posttest questionnaires, the second E took them into the room behind the two way mirror where a third E adminis-

tered a post-experimental questionnaire. This questionnaire was designed to determine whether the Ss (a) felt pressured to reach a decision, (b) felt pressured to choose a particular candidate, and (c) had knowledge of the experimental purpose. If they indicated feeling pressured or knowledge of the purpose the E probed further. No dyads were eliminated due to these questions. Further, the Ss were asked to indicate whether they knew the other S with whom they interacted. Only one dyad was eliminated due to past history. After discussing these issues, the third E had the Ss read a debriefing statement. The Ss were thanked for their participation and asked not to discuss the experiment with any of their classmates, since the experiment was conducted over a period of a week.

Behavioral Coding Procedures. The videotaped interactions (N=55) were viewed by 18 judges working in pairs. A variety of nonverbal behaviors were coded using a combination of different codification systems. Five types of behaviors were coded including proxemic, kinesic, vocalic, interaction, and turn-taking behaviors. Figure 1 contains a list of the types of behaviors coded and the method used in coding. Two types of methods were employed. A quantitative counting procedure was used for some behaviors, while others were rated using seven-point semantic differential scales. The proxemic and turn-taking measures were designed specifically for this study. The kinesics measures were selected from a kinesic coding system developed by Friesen, Ekman and Wallbott (1979). The interaction behavior was coded using McCroskey & Wright's (1971) Interaction Behavior Measure and the vocalic behaviors were coded using Burgoon's (1978) Vocal Behavior Measure.

Each ten minute interaction was divided into five two minute

intervals. All behaviors were assessed at the end of each two minute period by teams of two judges working independently on one of the five nonverbal areas. Thus, each interaction had a maximum of five measures of each nonverbal behavior. Most judges were able to rate both interactants at the same time, except for kinesic behavior where judges rated one interactant at a time. Consistency in timing was achieved by superimposing a digital timer in the upper right hand corner of the videotape for each dyad.

In the process of coding the dyads, it was discovered that three dyads were not properly taped, eliminating them from the subsequent analysis. The final number of dyads coded was 55.

Statistical Analysis. Research question one was explored using a principal components factor analysis employing varimax rotation with commonalities in the diagonals. All the proxemic and vocalic behaviors and the illustrators and general animation scales of the kinesic behaviors were entered into the factor analysis. Raw score sums were formed using those items with primary loading on each factor to produce a set of scales of nonverbal behavior. Adaptor behavior was excluded from the factor analysis due to errors in coding. The interaction behaviors were excluded, since they were a combination of verbal and nonverbal behaviors.[1]

The second and third questions were examined using a series of multiple discriminant analyses. One discriminant analysis tested the predictive power of the aggregate scores for each of the behavioral factors and a body orientation variable created by summing across raters and time periods. These total scores were used to predict membership in the winning, losing, and undecided groups. This dependent variable was used in

all the discriminant analyses. Another series of discriminant analyses was performed for the within time period measures. Each of the factors, from the factor analysis, plus the body orientation was entered into a discriminant analysis for each time period. Thus, five discriminant analyses were performed. In all discriminant analyses, the variables were entered simultaneously and classification was adjusted for the size of the dependent variable groups.[2] The alpha levels for the research questions were set a .10 due to the two-tailed nature of the test. (Additionally, Winer (1971) suggests that alpha levels be increased for tests of an exploratory nature.)

Reliabilities were calculated for all the behavioral scales as well as for the body orientation variable. Ebel's intraclass correlation (Winer, 1971) was calculated for all the scales and the body orientation variable, and inter-item reliabilities in the form of Cronbach's alpha were calculated for all the factors. These reliabilities are reported in Table 1. The intraclass correlations and the inter-item reliabilities except the rocking and twisting and random limb and trunk movement scale and the kinesic scale were adequately high. In order to correct for the low inter-item reliability in the two scales -- random movement and kinesics -- these scales were computed using standardized scores.

## Results

The results of the factor analysis revealed five factors with eigenvalues greater than one, accounting for 74.3% of the variance (Table 1). The first factor, a proxemic shift factor, consisted of the three measures of proxemic shifting -- shifting closer, shifting farther and reorienting shifts -- and accounted for 25.7% of the variance. The second factor, a

vocal intensity factor, consisted of measures of three vocalic behaviors -- vocal intensity, vocal loudness and vocal rate -- and accounted for 24.4% of the variance. The third factor, a vocal quality factor, consisted of four vocalic behavior measures -- vocal fluency, vocal pleasantness, vocal clarity and vocal pitch variety -- and accounted for 10.2% of the variance. The fourth factor, a kinesics factor, consisted of two kinesics measures -- number of illustrators and general animation -- and accounted for 7.5% of the variance. The fifth factor, a random movement factor, consisted of measures of two proxemic behaviors -- random limb and trunk movement and rocking and twisting -- and accounted for 6.5% of the variance. An examination of the reliabilities of these scales indicates that the proxemic shift, vocal intensity and vocal quality factors are all very stable; however, the low inter-item reliabilities of the kinesics and random movement factors indicates some instability in these factors.

The results of the discriminant analysis of the measures aggregated across the interaction indicate that positive relationships with the winning variable occurred for proxemic shifts, kinesic behaviors, vocal intensity (including speech rate), and body orientation. The vocal quality factor and the single item random body movements item demonstrated a negative relationship with winning. The results indicate that membership in the winning group was more likely for sources who exhibited proxemic shifts, gestural animation, intense vocal cues, less fluent speech, direct body orientation and little random limb and trunk movement. (Table 2)

An examination of the standardized coefficients gives an indication of the relative size of effect of each of the six predictor variables. These coefficients show that the vocal quality factor has the greatest effect on

the prediction of attitude change. The second vocal factor, vocal intensity, is the next best predictor, followed by random movements, proxemic shifts, kinesic behavior and body orientation, in descending order of effect. In addition, the vocal quality and vocal intensity factors had their highest loadings on the first discriminant function after varimax rotation, while the other four nonverbal measures had their highest loadings on a second, nonsignificant, function. This suggests that the vocal cues are exerting the most influence in the prediction of group membership. Wilk's Lamdba for the first function is .83 indicating that this function contains almost all of the discriminating power of the predictor variables. The canonical correlation ($R_c$) was .37 indicating moderate predictive power for this function. The discriminating power of the function is only moderate, classifying correctly 46.36% of the cases. This, however, is better than a chance classification of 33.33%.

Table 2 also includes the results of the discriminant analysis performed on the measures taken within each two-minute time interval. The results reveal that very few of the measures within each time period predicted the outcome. Three significant functions, however, did occur, in the first, third and fifth time periods. In the first time period, vocal quality of the speaker predicted her/his failing to produce attitude change in the partner. This function had a Wilk's Lambda of .96, $R_c$ of .21 and correctly classified 50% of the cases (slightly better than the classification record of the aggregate function (46.36%)). The function for the third time period also contained only a single significant predictor, kinesic behavior. Here, too, the exhibition of kinesic behavior in this time period predicted less receiver attitude change. This function had a

Wilk's Lambda of .95, $R_c$ of .22 and correctly classified less of the cases (44.55%) than did the aggregate function or the time period one function. For the fifth time period, the vocal intensity factor predicted less receiver attitude change. This function also correctly classified 44.55% of the cases, and produced a Wilk's Lambda of .96 and a $R_c$ of .21. The coefficient for this function, while being significant, was extremely low, indicating a very small effect for this variable.

One further note is necessary when interpreting the results of these analyses. For all of the discriminant analyses, except the time period one analysis, the Box's M test for equality of group covariance matrices was significant. The discriminant analysis assumes that all group covariance matrices are equal. The significant Box's M indicates that they were not. The effect of this inequality is to bias the analysis toward the null hypothesis that the predictors will not be able to distinguish between the groups defined by the winning variable. Thus, the tests are more conservative than would normally be the case (McLaughlin, 1980). This is not too important for the aggregate analysis where the significance of the predictors is high; however, in the case of the exploratory time period analyses, this violation of assumptions of the test may have prohibited the discovery of other significant but weak predictors.

## Discussion

The results of the factor analysis lend further support to the notion that individual nonverbal cues vary consistently, in combination with each other. This consistency of variation appears to be limited to cues within each of the three nonverbal channels, proxemics, kinesics, and vocalics,

rather than across them. This, however, may be a statistical artifact of the codification methodology which had individual coders make observations within rather than across nonverbal channels. The statistical lack of consistent across channel variation may be more a function of inconsistencies across coders rather than across nonverbal channels. Further, the method of increasing the number of observations to 1100, by considering each time period as a case, may have increased the within coder and within channel consistency while decreasing the across coder and across channel consistency. A second possibility is that these factors possess second order unidimensionality, that is the within channel factors vary consistently together. Past research suggests that such across channel combinations do exist (Mehrabian & Williams, 1969), so it is surprising that they did not appear here.

It is, however, important that some combinations of cues were identified. This argues for research focusing on variations in larger patterns of nonverbal behavior rather than of individual nonverbal cues. That the single cue of body orientations was the least effective in discriminating between winners, losers and those who were undecided also argues for the use of combinations of nonverbal cues. It seems more natural to conceive of such patterns influencing communicative outcomes, as opposed to a single cue. Rarely does an individual nonverbal behavior vary alone. Thus, a measurement method which is limited to observing single cues does not reflect as accurately the natural characteristics of nonverbal behavior as does a method which focuses on combinations of cues.

Generally speaking, the results of the aggregate analysis confirmed those of past experiments. Specifically, the results for vocal intensity

(including speech rate), body orientation, kinesic cues and conversational proximity were consistent with the previous findings. The effects of vocal intensity and conversational proximity were greater than those for body orientation and kinesic cues, as indicated by the standardized coefficients (Table 2). This may indicate that the former two are primary cues while the latter two are of secondary value. These secondary cues may be important only to the extent that they are consistent or inconsistent with the primary ones. This suggests a modification role for these secondary cues, though the lack of interaction terms in the discriminant functions precludes a test of this hypothesis.

The vocal quality results are inconsistent with previous research. Studies have shown that vocal fluency (a component of the vocal quality factor) is positively related to credibility perceptions and subsequently to attitude change (McCroskey & Mehrley, 1969; Miller & Hewgill, 1964; Sereno & Hawkins, 1967). Further, research on good versus poor vocal encoders (Hall, 1980) has shown that good encoders using a more pleasant voice obtain more compliance. Why should pleasant vocal pattern exhibited by a participant in this study lead to less attitude change by the partner? Three possible explanations come to mind. First, in this experimental situation, both participants were supplied with the same amount of information about the applicants and the job; therefore, credibility may not have been important in this discussion. Further, the interactants were probably well aware that their partners were of similar status. Hence, the more pleasant vocal quality did not enhance the credibility of the interactant. This does not explain, however, why the vocally pleasant person would loose. A second possible explanation is that the high vocal quality

was perceived as too affiliative. Since there was no relational history between the interactants, extreme vocal pleasantness may have seemed ingratiating, leading to less liking and less compliance. Finally, the vocally pleasant speaker may have seemed too involved in the experimental task. Since the participants were participating to earn extra-credit, some participants were probably less involved with the task than others. These participants may have had negative perceptions of partners which displayed extreme enthusiasm through extreme vocal pleasantness. This led to resistance by the less involved subjects.

The vocal pleasantness factor in time period one also was negatively related to compliance by the partner. In fact, its function discriminated between the groups of participants better than did the function consisting of the aggregate factors. This early effect may lend more support to the first impression explanations offered above. It may also be related to cognitive processing in the vocally pleasant participant. Siegman (1979a, 1979b) argues that nonfluencies in the form of vocal pauses are an indication of cognitive processing. It may be that a person who scores high on the vocal pleasantness factor is not engaging in deep thought about her/his arguments. Rather they may be focusing on the presentation style of the arguments. This may lead to the formulation of invalid or weak arguments early in the interaction that are subsequently disproved or dismissed by the partner. Further, the vocal pleasantness may be less distracting to the winning communicator than vocal unpleasantness. Thus the partner has ample opportunity to counterargue, mentally, against the pleasant source's arguments, leading to less attitude change.

An important finding of the aggregate analysis is that the vocal

behaviors were the best discriminators between the groups of subjects. Past research has demonstrated that vocal cues are more important than visual cues in communicating dominance (DePaulo & Rosenthal, 1979). It may be that the vocal intensity cues are used to establish dominance hierarchies in the present study. A speaker who is more vocally intense may be allowed to assume a more dominant role, producing more agreement with her/his arguments. Another possible effect of the vocal cues is to cause the listener to focus on the message content. Zimbardo, Snyder, Thomas, Gold and Gurwitz (1970) and Burgoon, Cohen, Miller and Montgomery (1978) found that a speaker who was distracted by tasks requiring greater focus on the message (critical analysis of the arguments) were more likely to change in the direction of the message. Regardless of which process is operating, dominance or distraction, vocal cues appear to be an important part of the nonverbal message during persuasion.

The next most important cue is random body movement. This is probably more an unintentional nervousness display on the part of the losing communicator than an intentionally communicated message. As such, the communicative value of this cue is at best limited.

The analysis of the time period data, while not as conclusive as had been hoped initially, is encouraging. The fact that cues in three of the five time periods were able to discriminate between the groups at better than chance levels is important. The most interesting of the three time period functions is the vocal quality function in the first time period. Its unexpected direction of effect and the vocal quality factor's primacy in the aggregate data suggests that this combination of cues displayed early in an interaction may be critical to the outcome. The functions

detected in the other time periods are of significant, but lesser, importance. Kinesic behavior in the third time period and vocal intensity in the fifth time period is negatively related to the attitude change in the receiver. The kinesic cues may be an attempt by the losing communicator to strengthen her/his arguments by becoming more animated. The vocal intensity cues in the last period may be serving the same function, or they may be signaling nervousness similar to the random movement cues.

The aggregate data still provided the most significant result as well as the strongest discriminant function. As noted earlier, this may be a function of the data reduction procedures inherent in the aggregation of measurements across the entire interaction. Another possible explanation is that nonverbal phenomena may require such aggregation methods. The subtle nature of some of the nonverbal cues, especially those that loaded only slightly on the function formed by the across interaction aggregates of random movements, proxemic shifts, kinesic behavior and body orientation, may have precluded detecting any effect of these cues, except through the use of a total interaction measure. Support for this is evident from the lack of predictive power of these cues in the functions formed by the measurements taken at short intervals within the interaction. On the other hand, without short time period analyses, the relative differences in predictive power of various cues and the timing of important cue displays would go undetected. It is necessary for researchers interested in nonverbal communicative behavior to be aware that some cues are especially strong in their effect at specific times in an interaction, while others have a more subtle effect detectable only with procedures which aggregate their displays across the entire interaction.

Further research on combinations of nonverbal cues is necessary. It appears that the effect of cue displays are influenced by the other cues displayed concomitantly. An attempt to integrate cue combinations into research on violations of expectations, arousal, and approach-avoidance models of nonverbal communication may prove beneficial to the understanding of nonverbal communication's role in persuasive and other communicative interchanges. Additional research also is required to further test the validity of the aggregation measurement techniques. While some advantages do accrue from these methods, if research is limited to measurements of the total number or degree of displays across the entire interaction it seems that important information may be overlooked concerning temporal positioning of cues and the relationship of a cue display to previous cue displays.

NOTES

[1] The factor analysis was performed on a set of 1100 observations formed by treating each time period as a different observation. This was necessary to increase the number of observations to a level where the resulting factor structure would be stable. Using individual subjects as observations (N=110) would not have produced such stability.

[2] A problem occurred when analyzing the data from dyads which failed to use the entire ten minutes for their interaction. It seemed improper to treat the third time period of an interaction which only occurred for six minutes as similar to the third time period of an interaction which lasted a full ten minutes. Also, it seemed incorrect to consider the second time period of a six minute interaction as similar to the second time period of a ten minute interaction. Hence, an adjustment procedure was employed which standardized, to some extent, the time periods across all experimental interactions. This procedure treated the second time period of a three period interaction as the third time period and the third time period of a three period interaction as the fifth time period. The second and fourth time periods in a three period interaction were considered to be zero in value. For a four period interaction, the first and second periods remained unchanged, the third time period was treated as the fourth time period and the fourth time period was treated as the fifth time period. The third time period was considered zero in value. Finally, for a two period interaction, the first period remained unchanged, the second period was treated as the fifth period and all other periods were considered to be zero in value. 61 dyads interacted in all 5 time periods; 82 dyads interacted in 4 of 5 time periods; 98 dyads interacted in 3 of 5 time periods.

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Table 1

Reliabilities: Ebel's Intraclass Correlation and Cronbach's Alpha

| Variable/Scale | Intraclass Correlation (Inter-Rater Reliability) | Alpha (Inter-Item Reliability) |
|---|---|---|
| Proxemic<br>Shifts Closer<br>Shifts Farther<br>Reorienting Shifts | .84 | .92 |
| Kinesics Scale<br>Illustrators<br>General Animation | .95 | .40 (.84)* |
| Random Movement Scale<br>Rocking & Twisting<br>Random Limb & Trunk Movement | .78 | .51 (.57)* |
| Vocal Quality Scale<br>Fluency<br>Pleasantness<br>Clarity<br>Pitch Variety | .76 | .74 |
| Vocal Intensity Scale<br>Intensity<br>Loudness<br>Rate | .89 | .88 |
| Directness of Orientation | .82 | ** |

* Standardized Alpha Coefficients.

** Not computable due to single item measure.

Table 2

Significant Canonical Discriminant Function Coefficients*

| Scale/Variable | Aggregate** | Time Period 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Proxemic Shifts | -.006 (2.44) | | | | | |
| Random Movement | .04 (-5.11) | | | | | |
| Kinesics | -.008 (1.12) | | | 1.15 | | |
| Vocal Quality | .05 (6.11) | .34*** | | | | |
| Vocal Intensity | -.03 (-4.47) | | | | | .005 |
| Body Orientation | -.39 (.69) | | | | | |
| Constant | -.19 | -6.62 | | -.10 | | .19 |
| Wilk's Lambda | .83 | .96 | | .95 | | .96 |
| % of cases correctly classified | 46.36 | 50.00 | | 44.55 | | 44.55 |

*In each discriminant analysis reported, only one significant function occurred.
**Aggregate results are presented as unstandardized coefficients with standardized coefficients in parentheses.
***Coefficients for time period functions are reported unstandardized with all nonpredicting variables removed from the discriminant functions.

## Figure Caption

Figure 1. Nonverbal communicative behavior codification system.

Figure 1

| Behavior | Type of Measure | |
|---|---|---|
| **Proxemics** | | |
| Shifts Closer | Count | |
| Shifts Further | Count | |
| Reorienting Shifts | Count | |
| Total Shifts/Time Period | Count | |
| Rocking & Twisting | 1 = None | 7 = Extremely Frequent |
| Random Limb & Truck Movement | 1 = None | 7 = Extremely Frequent |
| Directness of Orientation | 1 = Indirect | 7 = Direct |
| **Kinescis** | | |
| Illustrators | Count | |
| Shrug Emblems | Count | |
| Brief Face/Head Adaptors | Count | |
| Long Face/Head Adaptors | Count | |
| Brief Body Adaptors | Count | |
| Long Body Adaptors | Count | |
| Brief Object Adaptors | Count | |
| Long Object Adaptors | Count | |
| Total Gestures/Time Period | Count | |
| General Animation | 1 = Unanimated | 7 = Animated |
| **Interaction Behavior (IBM)** | | |
| Verbosity A | 1 = Brief | 7 = Lengthy |
| Verbosity B | 1 = Short | 7 = Wordy |
| Tension A | 1 = Cool | 7 = Bothered |
| Tension b | 1 = Relaxed | 7 = Tense |
| Interest A | 1 = Withdrawn | 7 = Involved |
| Interest B | 1 = Apathetic | 7 = Interested |
| Relevance A | 1 = Irrelevant | 7 = Relevant |
| Relevance B | 1 = Unrelated | 7 = Related |
| Task/Social Orientation A | 1 = Socially Oriented | 7 = Task Oriented |
| Task/Social Orientation B | 1 = Personal | 7 = Ideational |
| Flexibility A | 1 = Inflexible | 7 = Flexible |
| Flexibility B | 1 = Unchangeable | 7 = Changeable |
| **Vocalics** | | |
| Fleuncy | 1 = Nonfluent | 7 = Fluent |
| Loudness | 1 = Soft | 7 = Loud |
| Pleasantness | 1 = Unpleasant | 7 = Pleasant |
| Intensity | 1 = Nonintense | 7 = Intense |
| Clarity | 1 = Unclear | 7 = Clear |
| Rate | 1 = Slow | 7 = Fast |
| Pitch Variety | 1 = Monotone | 7 = Varied |
| **Turn-Taking Behavior** | | |
| Closed Turn Endings | Count | |
| Open Turn Endings | Count | |
| Smooth Exchanges | Count | |
| Overlong Switches | Count | |
| Interruptions | Count | |
| Talkovers | Count | |
| Backchanneling | Count | |
| Speech Disturbance | Count | |
| Turn Time/Time Period | Count | |